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Visual landscape quality in landscape planning: Examples of Kars and Ardahan cities in Turkey

Osman Uzun* and Haldun Müderriso lu

Department of Landscape Architecture, Faculty of Forestry, Düzce University, Düzce, Turkey.

Together with European landscape convention, it is required that studies related to landscape planning should be integrated with the sectors such as department of urban and regional planning, industry, agriculture and forestry. Visual landscape analysis has an important position in landscape planning. In this study, it is aimed that a method for visual landscape quality which is one of the researches of landscape analysis is developed in a physical planning workout that is to be carried out in Kars and Ardahan. The data that is to represent the seven factors are: Landform, vegetation, water, color, influence of adjacent scenery, scarcity, cultural modifications, in practicing the visual source management method has been constructed in the environment of geographical information systems by making use of the databases of Ministry of Environment and Forestry and Corine land cover. The accuracy of visual landscape quality maps has been proved by practicing the method in site conditions and in twenty three different points. This situation proves that the method can safely be practiced in the studies such as sub-regional scales, planning and strategic environmental assessment.

Key words: Ardahan, Kars, landscape planning, visual quality.

INTRODUCTION

Together with signing European landscape convention, the countries that have signed the convention shoulder some responsibility on the subject of defining landscapes, assessing their qualities, forming a policy about them and taking protection and management decisions (Council of Europe, 2003). Different studies have been carried out in Europe and America regarding defining and evaluating landscapes since 1960s. (Ryan, 2005; Kennedy et al., 1988). Assessing the visual and ecological qualities of landscapes is the leading study of landscape planning and it also has the opportunity of different uses in landscape analysis.

Physical planning process in Turkey is in the way of regional plan, environmental plan, and municipal plan. In our country, 1/ 100 000- scaled city or cities leveled environmental plans have been formed by Ministry of Environment and Forestry in recent years. There have been some deficiencies in defining landscapes, analysis,

assessments and forming a policy. However, together with the acknowledgement of European landscape convention in our country, the need for evaluations and analysis on landscapes is increasing day by day. Within this concept, examining and evaluating landscape visually in the regional or semi-regional planning studies has formed one of the cornerstones in taking planning decisions.

Even though there have been studies within the concept of assessing landscape visually in our country, we have not discovered a method that is used with regional or semi-regional scales. ahin et al. (2007) have used sub scaled visual evaluation method in Akda National Park. Çakçi (2007) has used it in public parks.

Human is the most important factor that affects and changes landscapes (Naveh, 1995). This change is the concrete result that is formed as a result of the interaction between nature and culture (Altman and Chemers, 1980; Smardon, 1983). It is inevitable to perceive the changes that are to be made with natural and cultural structured planning and management decisions as visual. The physical character of the landscape can be defined according to its visual features. Therefore, there is a need for the assessments that will provide us to obtain the

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*Corresponding author. E-mail: osmanuzun@duzce.edu.tr, pmosmanuzun@hotmail.com. Tel: 00 90 (380) 542 11 37. Fax: 00 90 (380) 542 11 36.

environmental data which is required for developing the land use decisions and present the visual quality of the landscape. (Jakle, 1987; Zhang, 2000). Tveit et al. (2006) accounts for the benefits of the assessment in that it provides clear and precise data that is to explain the structure of landscape, it simplifies the use of the current data, it keeps up with all landscape changes and it makes contribution to planning decisions.

There may be some concerns regarding the fact that visual landscape analysis is not based on an ecological structure. Fry et al. (2009) stated in their studies that the criteria for the visual-based or ecological-base classifications of landscapes are substantially common.

Visual landscape quality assessment studies were commenced by Bureau of land management in United States of America in 1960s (Ryan, 2005; Kennedy et al., 1988). The studies conducted can be divided into two; the user assessments and expert-based assessments (Tveit et al., 2006; Daniels and Vining, 1983). Visual landscape quality assessments are conducted not only by landscape architects but also various experts such as sociologists, computer scientists and psychologists (Ryan, 2005) . As a result of these studies that are conducted by different experts, different named models such as visual quality, scenic beauty and visual impact have emerged (Daniel and Boster, 1976). There are three models that have been used mostly in visual landscape assessments. They are landscape character assessment (Swanwick, 2002), scenic beauty estimation (Daniel and Boster, 1976) and visual resource management which is chosen as the method of this study (Bureau of Land Management (BLM), 1980). Bureau of land management of USA has explained the necessity of visual resource management model; landscapes that have different visual quality need different management forms and assessing the visual quality of landscape is a subjective task. We need to use ecological and visual-based criteria explaining the main features of the landscape such as landform, color, water surface, scarcity to increase the objectivity (Fry et al., 2009). For all these reasons, visual resource management is a suitable model for assessing visual landscape quality and managing the resources.

There are nine factors that will be of assistance for assessing landscapes: the stewardship factor (Van Mansvelt and Kuiper, 1999); coherence factor (Kaplan and Kaplan, 1989; Bell, 1999); disturbance factor (Hernandez et al., 2004); historicity factor (Strumse,1994; Hooke, 2000); visual scale factor (Clay and Smidt, 2004; Weinstoerffer and Girardin, 2000); image ability factor (Green,1999; Van Mansvelt and Kuiper, 1999); complexity factor (Kaplan and Kaplan, 1989; Hanyu, 2000); naturalness factor (Purcell and Lamb, 1998; Gobster, 1999); ephemera factor (Hands and Brown, 2002; Jorgensen et al., 2002).

The use computer technology to assess the visual quality of landscape is increasing day by day. Computer technologies such as simulations (Bishop et al. 2001; Miller, 2001), modeling (Gimblett et al., 2001; Perrin et al.,

2001), visibility analysis (Oh, 2001; Schmid, 2001) and geographic information system (Panagopoulos, 2001; Gimblett et al., 2001; Güngör and Dilek, 2006; Cengiz and Akbulak, 2009) are applied in the assessments. The use of GIS in the assessment of visual landscape quality methodically is increasing day by day (Bishop and Hulse, 1994; Steinitz, 1990; Bergen et al., 1993; Crawford, 1994; Panagopuolus, 2001). Ayad (2005) emphasized that the most practical and cheapest way to make a decision about regional scale is to interpret the remote sensing data with geographic information system.

According to Anonymous (2010), visual resource management is used in Sloan Canyon National Conservation Area. As there is not a private guide for small areas (48,438) in BLM manual handbook 8410 to 8411, the methodology is applied according to standard inventory addition forms of BLM but an adaptation is made for small areas. Visual landscape quality is also used in the decision process in various studies. For example visual quality and visual fragility combinations were assessed in one of Ramos' studies (1980) (Anonymous, 2000) . Also, Visual landscape assessments are used frequently in environmental impact assessments (VRM Arica, 2008). The aim of this study is to assess visual landscape quality values of Ardahan and Kars cities and to state the methodical approach to visual landscape quality in planning studies. With this design, the goals are set below:

(1) Adaptation of the method of visual resource management that is used by BLM (2010a) to the sub-regional scale cities Ardahan and Kars.
(2) To state which sub scaled maps should be used to practice visual resource management method with geographic information system and how they should be evaluated.
(3) Classification of the analysis that is performed with geographic information system and quality values for visual landscape in the process of practicing the method.
(4) Verification of visual landscape qualities with field observations.

MATERIALS AND METHOD

Materials

The research areas are Kars and Ardahan cities situated in the Northeast of Turkey (Figure 1). Ardahan is located on Eastern Anatolian Region and it has 1.800 m height. There is Georgia in the north, Georgia and Armenia in the east, Kars and Erzurum in the south and Artvin in the west of Ardahan. As the city has continental climate, winter is long, hard and snowy and summer is short and cool. The vegetation of the city mostly consists of natural grass and meadows. The city has the most mountainous and roughest field pattern of Eastern Anatolian Region. The city centre is situated on lowland and there is river called Kura in the middle of it. The square measure of the city is 4.842 km^2 (Anonim, 2008a).

Kars is located on the northeast zone of Eastern Anatolian Region and average height of the city is 1768 m. There is Ardahan in the north, A ri in the south, I dir in the southeast, Armenia in the east and Erzurum in the west of Kars. The city is situated in Eastern
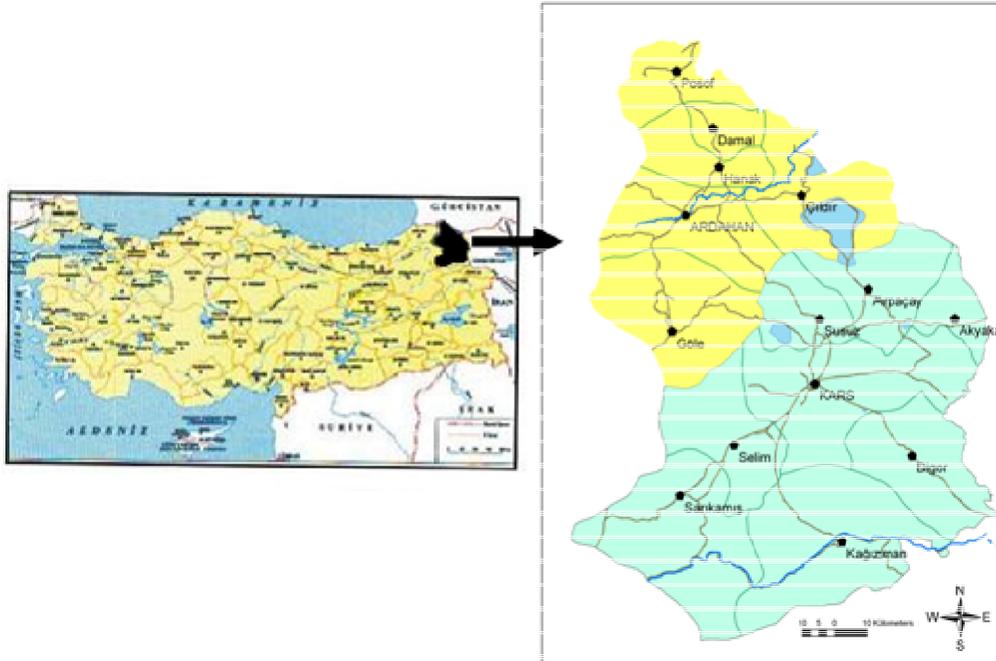
Figure 1. Study area.

anatolian Region and it is under the influence of continental climate. In continental climate, temperature difference between summer and winter is high; precipitation takes place mostly in spring and summer seasons and drought is dominant in summers. All the lands of Kars are located on the Caspian Sea major basin. A big amount of the water that is removed from the city lands flows into the Caspian Sea through Aras River. The most important rivers of the city are Aras River and Kars Stream. There are a lot of large and small lakes in Kars. The major ones are Lake Çildir, some part of which is located in Ardahan, Lake Aygir, Lake Kuyucuk and Lake Turna. Besides these natural lakes, the only artificial Lake is Arpaçay Barrage Lake. The total square measure of the city is 10.127 km^2 (Anonim, 2008b).

The data sources used in the method described below. For the criteria that explain the landform factor; national parks, wetlands, the other protected areas maps that take place in the database of Ministry of Environment and Forestry have been employed and for the assessments of height changes, General Command of Mapping 1/ 100 000 scaled topographic maps have been used. For the criteria explaining the vegetation factor, Corine land cover 2006 data that are prepared by EFM have been employed. For the criteria that explain the water factor, the maps from the database of EFM, the maps that include dam, lake, wetland, river, stream and creek and also 1000 m protection zone border, which is total for absolute and short distances that are stated in water pollution control regulations, have been used. For the criteria that explain the color factor, the classification, which is a Corine land cover type, regarding artificial green areas, agricultural areas, forest and semi-natural areas, wetlands and water structure has been used. For the criteria explaining influence of adjacent scenery factor, arterial roads and the front, middle and far images of the roads that take place 1/ 100 000 scaled topographic maps by GCM have been employed and moreover, height difference that may affect the visibility distance has been marked. Agricultural areas with high visibility have been used to detect adjacent scenery in Corine land cover map. For the criteria explaining the scarcity factor, the maps including national parks, wildlife protection areas, natural protected areas, wetlands, continental reeds and lakes that take place in EFM

database have been applied. Also, for the forest lands that cannot be observed frequently, stand maps from EFM database have been used. Additionally, scrubs and grasses from the group of Corine land cover and height differences that are taken from GCM 1/ 100 000 scaled topographic maps have been used. While assessing the height values, the ones that are out of the average height groups are marked. For the criteria that explain cultural modifications factor, while EFM takes cultural positive value from the maps that is digitized, the agricultural areas from Corine land cover groups have been evaluated as zero. Structural areas (excluding non-agricultural, artificial green areas) from Corine land cover groups have been evaluated as negative points as they are going to diminish the visual resource value.

These cities, Kars and Ardahan, have been chosen for the project because of the fact that 1/ 100 000 scaled environment plan is carried out in these cities by Ministry of Environment and Forestry and with the intention of providing data for this plan.

METHODS

This research is based on Visual Resource Management (VRM) model that has been developed by USA Bureau of Land Management (BLM, 2010b). VRM is a method that has been formed with the purpose of protecting the visual value of landscape and reducing the effect of various area usages on this value. The conducted landscape is classified according to the quality by using this methodology. As a result of this, maps for the visual quality of landscape are formed. Within this context, the methodology is developed so as to be used in regional or sub-regional scales.

In the methods that intend to assess the visual quality of landscape, expert and user assessments are used. In that kind of studies, the expert or the expert groups try to explain the current situation of the landscape (Kaplan, 1979). The experts compare and contrast the current situation of the physical elements that form the landscape (Daniel and Vining, 1983). In this study VRM methodology has been used depending on the expert assessments which contain two landscape planner.

The USA Bureau of Land Management "visual resource observation form" has been applied for visual landscape quality assessment. This form consists of seven factors as landform, vegetation, water, color, influence of adjacent scenery, scarcity, cultural modifications (Table 1). Three criteria for each factor have been used in order to explain the factors. The degree of the effect of criteria on the model has been taken from the original form without any alteration as seen in Table 1, while some criteria get maximum value, some of them have been evaluated as ineffective. The criteria that are considered to affect the visual quality adversely take place in the model with negative values.

Apart from the maps in the database, Corine land cover data (2006) (Coordination of information on the environment land cover) that have been prepared by making use of satellite images with the help of Ministry of Environment and Forestry have been used in order to assess the visual landscape quality. You can see the interpretation criteria regarding how the factors have been interpreted and how the visual quality points are given in Table 2.

In ArcGIS 9.3, a map for each factor has been formed. Then, by combining the maps for seven factors, one single map has been formed. As a result of these combinations, four visual landscape quality degrees have been defined according to the total points that the areas get. The ones that get points between 0 to 7 have first class visual landscape quality, the points between 8 and 15 have second class VLQ, the points between 16 and 23 have third class VLQ and the ones that get 24 and higher have forth class VLQ. VLQ classes intervals have been determined by maximum scores have been divided into four.

The accuracy of the data that is obtained from geographic information system has been controlled by filling the same land observation form in the certain zones of the land. For this purpose, 23 observation forms have been filled at the zones that are close to main lines of transportation of Kars and Ardahan. The areas have been divided into four visual landscape qualities according to the total points that they get. The points between 0 and 9 have first class visual landscape quality, the points between 10 and 16 have second class VLQ, the points between 17 and 22 have third class VLQ and 23 and the higher points have fourth class VLQ. VLQ classes intervals have been determined by maximum scores have been divided into four.

FINDINGS

In the visual quality assessments that have been conducted according to the visual research management methodology in Kars and Ardahan, analysis for seven criteria; landform, vegetation, water, color, influence of adjacent scenery, scarcity, cultural modifications, have been made and maps for each criteria have been obtained (Figure 2).

Landform

It is important in landscape quality assessments because of the universal monument areas such as sheer slopes and high mountains. The areas that have high visual value can be seen in Figure 2 in the landform assessment. There are much more areas with high visual value in Ardahan than in Kars.

Vegetation

One of the determinants of form and texture that make

difference in visual perception is vegetation. It also provides visual variety owing to the seasonal changes. There are much more areas that have visual quality in Ardahan than in Kars in terms of vegetation. One of the reasons for that is the plant diversity of Posof which is a town of Ardahan and also located on the climatic transition zone. Visual landscape quality of the area is considered as 3 points in terms of vegetation (Figure 2). Although the points of high visual value are seen in every part of the Ardahan, they center on the north and east of the city. Visual quality value increases in the south and southeast of Kars.

Water

Most of the researches that examine the landscape choices and the effect of water on it emphasize that water receives appreciation. The area is quite rich with water. A remarkable part of Aras Basin, which is one of the twenty five river basins in our country, is located in the borders of these two cities. As seen, Kars and Ardahan have high visual quality value in terms of water (Figure 2). Lake Çildir, which is the biggest lake of the region and situated in the northeast of the region is one of the areas that has high points in terms of water factor. The areas that come into prominence for visual quality in terms of water are mountainsides that form the source part of the streams and the points where the wetlands and lake take place.

Color

It is the fundamental component of the landscape. It may show change seasonally or periodically. Therefore, it gets high points thanks to the diversity, contrast and harmony that it creates. As seen in Figure 2, the region has quite high visual value in terms of color. Especially, almost every part of Ardahan has high visual landscape value in terms of color. Main reasons for the high points of Ardahan are Lake Çildir and plant diversity in the north regions under the influence of black sea climate. While the visual quality value gets maximum value in the north, northeast and northwest of Ardahan, this value is high in the south and the southwest in Kars.

Influence of adjacent scenery

The areas that are seen mostly in terms of view dept and width have been evaluated with high points in the influence of adjacent scenery factor. The areas that are up to 15 km far from the main road and the ones that are above the average height of the area have been considered as the areas with the highest visual value in terms of the influence of adjacent scenery (BLM, 2010b). Accordingly, Ardahan has higher values than Kars (Figure 2).

**Table 1.** Visual resource observation form (BLM, 2010a,b).

Key factor	Rating criteria	Score
Landform	High vertical relief as expressed in prominent cliffs, spires, or massive rock outcrops, or severe surface variation or highly eroded formations including major badlands or dune systems; or detail features dominant and exceptionally striking and intriguing such as glaciers	5
	Steep canyons, mesas, buttes, cinder cones, and drumlins; or interesting erosional patterns or variety in size and shape of landforms; or detail features which are interesting though not dominant or exceptional.	3
	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features	1
Vegetation	A variety of vegetative types as expressed in interesting forms, textures, and	5
	patterns Some variety of vegetation, but only one or two major types	3
	Little or no variety or contrast in vegetation.	1
Water	Clear and clean appearing, still, or cascading white water, any of which are a dominant factor in the landscape.	5
	Flowing, or still, but not dominant in the landscape.	3
	Absent, or present, but not noticeable.	0
Color	Rich color combinations, variety or vivid color; or pleasing contrasts in the soil, rock, vegetation, water or snow fields.	5
	Some intensity or variety in colors and contrast of the soil, rock and vegetation, but not a dominant scenic element.	3
	Subtle color variations, contrast, or interest; generally mute tones.	1
Influence of adjacent scenery	Adjacent scenery greatly enhances visual quality	5
	Adjacent scenery moderately enhances overall visual quality.	3
	Adjacent scenery has little or no influence on overall visual quality.	0
Scarcity	One of a kind; or unusually memorable, or very rare within region. Consistent chance for exceptional wildlife or wildflower viewing, etc.	5
	Distinctive, though somewhat similar to others within the region	3
	Interesting within its setting, but fairly common within the region.	1
Cultural modifications	Modifications add favorably to visual variety while promoting visual harmony.	2
	Modifications add little or no visual variety to the area, and introduce no discordant elements.	0
	Modifications add variety but are very discordant and promote strong disharmony.	- 4

Table 2. Interpretation of criteria in visual landscape quality method.

Key factor	Rating criteria and score	Rating criteria and score	Rating criteria and score
Landform	5: National Park, Wildlife development high elevation	Wetland, areas in 3: Elevation groups 2000-2500 m	1: Elevation groups 0-1500 m
		2500-3000 m	1500-2000 m
		3000> m	
Vegetation	5: Forests and semi-natural areas, Wetland, Coastal lagoons	3: Water courses, Pastures Agricultural areas, Artificial, non-agricultural vegetated areas	1: Open spaces with little or no vegetation

Table 2. Contd.

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Water	5: Dam, wetland, River, Stream	3: Creek	0: Other areas
Color	5: Forests and semi-natural areas, Wetland, Coastal lagoons	3: Water courses, Pastures, Agricultural areas, Artificial, non-agricultural vegetated areas, Open spaces with little or no vegetation.	1: Artificial surfaces
Influence of Adjacent Scenery	5: More than 15 km from Motorway Elevation: more than 2500 m pastures,	3: Between 5 and 15 km from Motorway Agricultural areas	0: Other areas
Scarcity	5: National Park, Wetland, Wildlife development areas Inland marshes, Forestry, Lake, Natural sites; Elevation >2500 m	3: Elevation: 2000-2500 m Shrub and/or herbaceous vegetation associations	0: Other areas
Cultural modifications	2: Archaeological Sites	0: Villages Agricultural areas	-4: Urban fabric, Industrial, commercial and transport, Mine, dump and construction sites
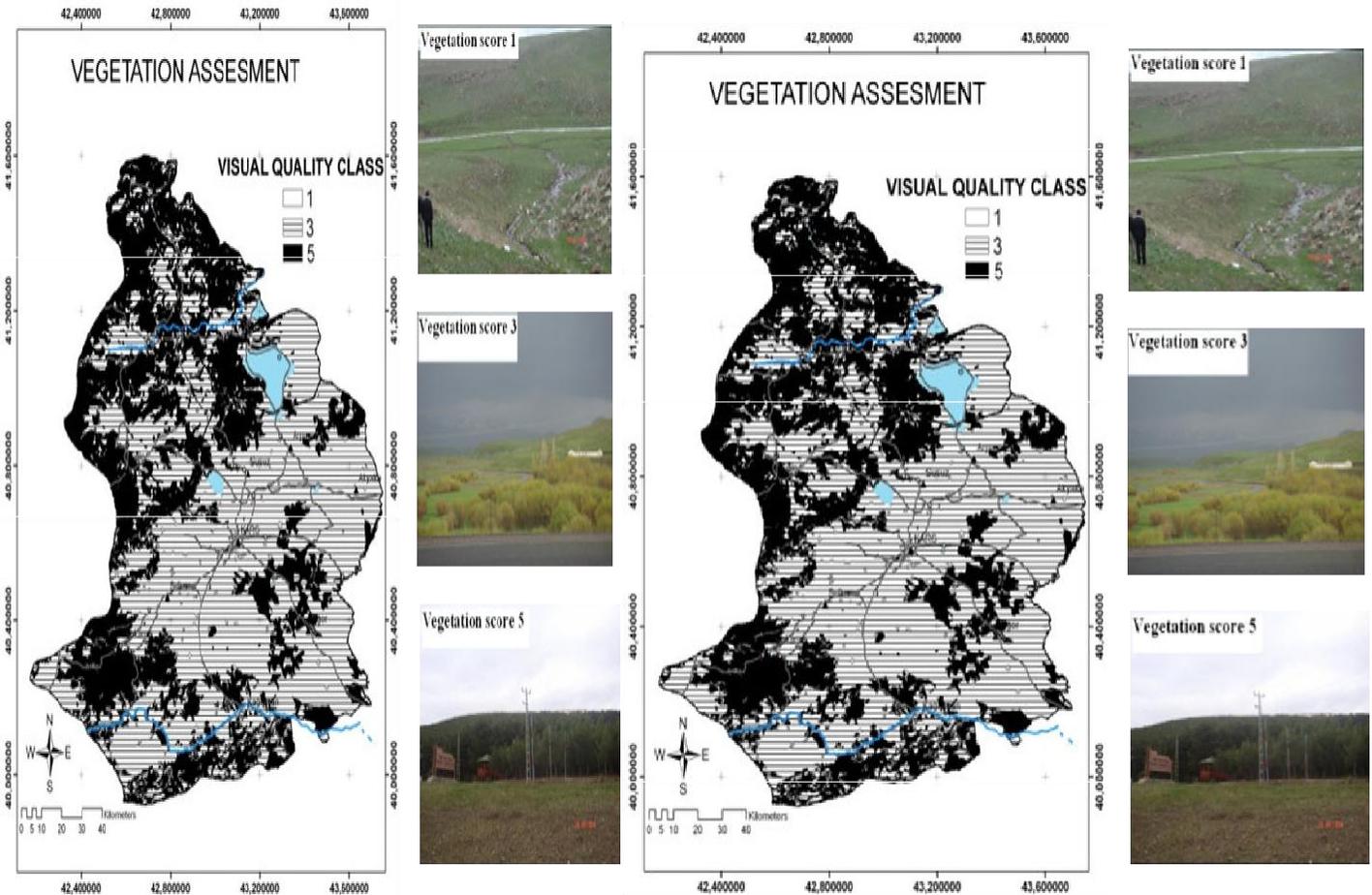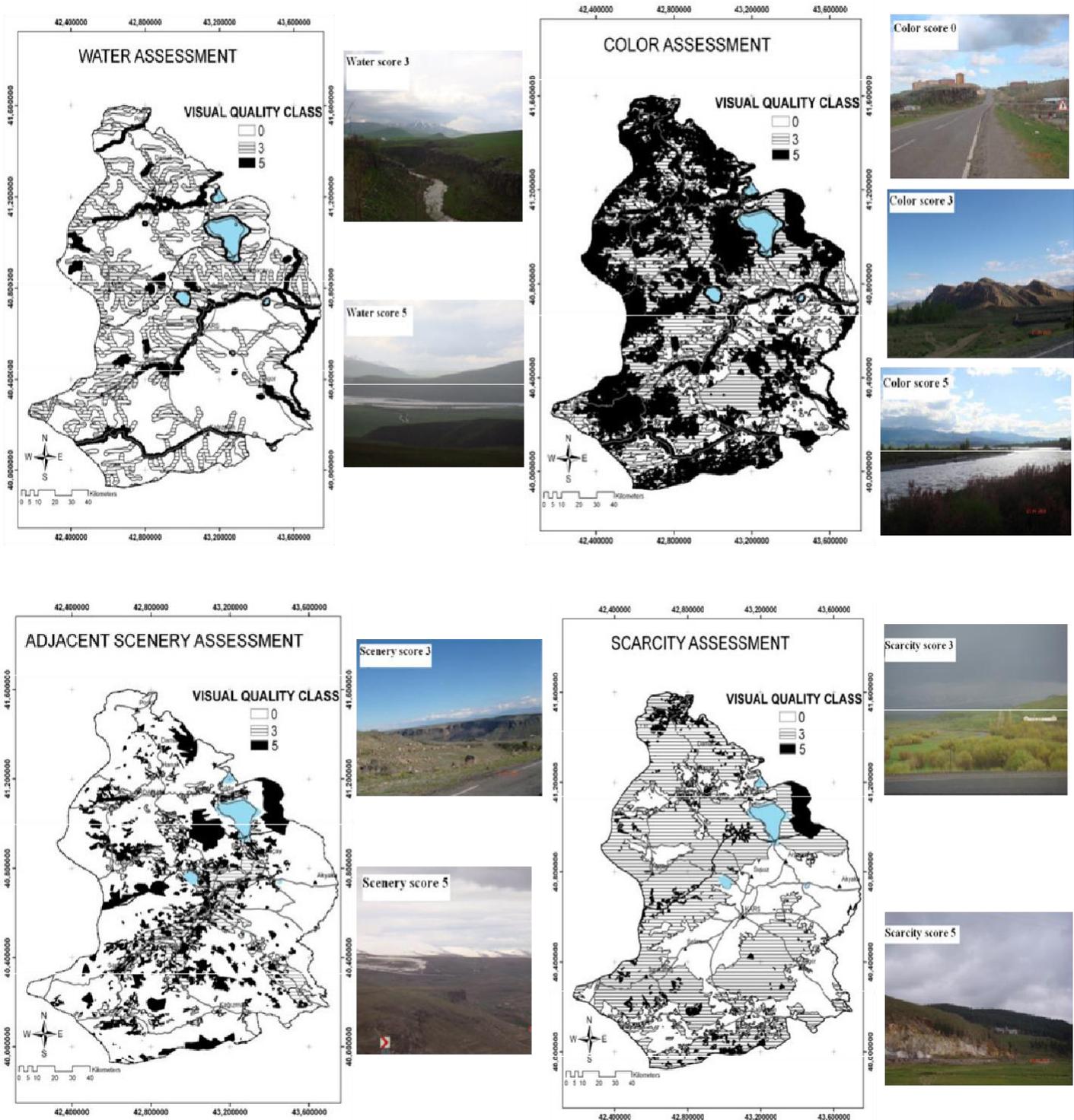
Figure 2. Factors that are used to visual quality assessments.

Scarcity

Unique or scarce landscape elements can get high values in this factor. High values are given to the protected areas and forested lands thanks to their scarcity. On the other hand, wetlands and lakes are richer than the other areas in terms of biological diversity and so they haven't got high values in the scarcity factor.
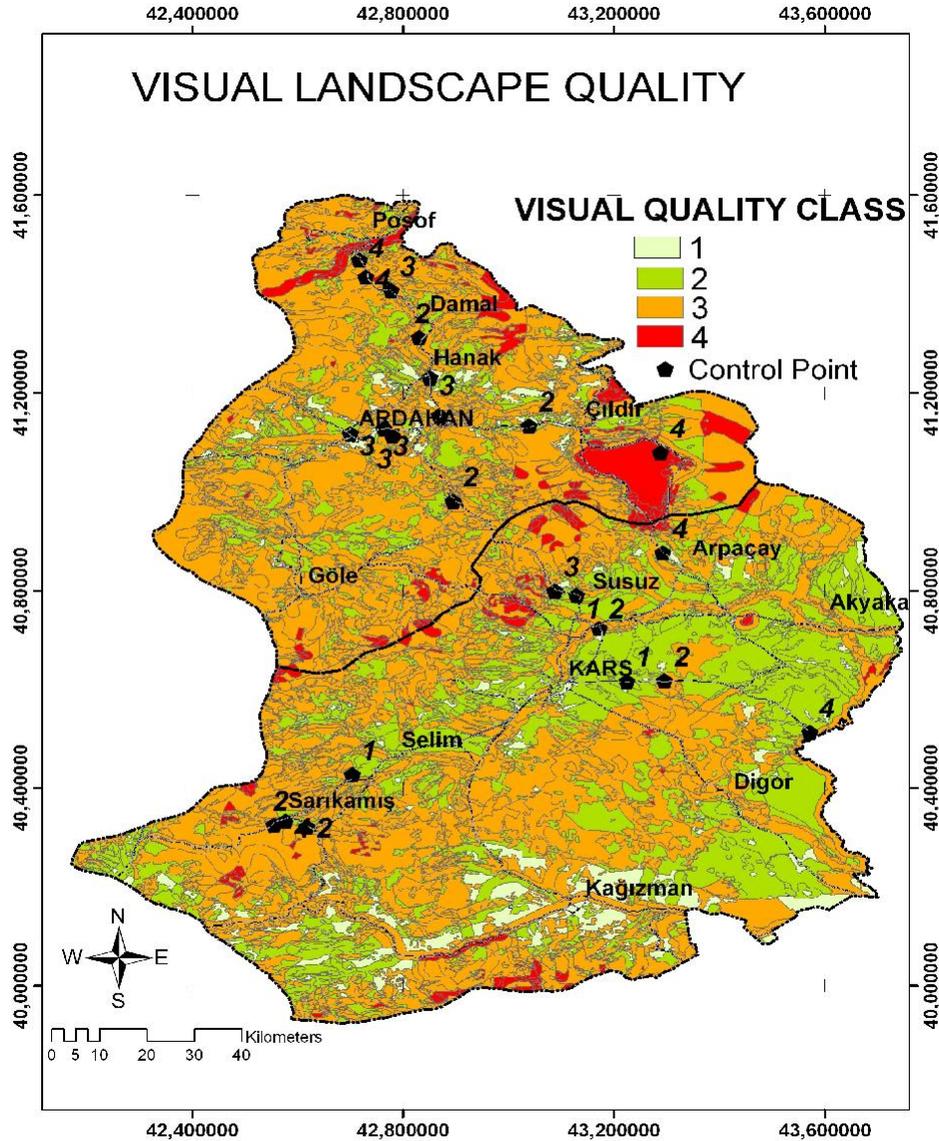
Figure 3. Visual landscape quality classes.

Ardahan gets the highest value in term of scarcity thanks to the wildlife protection area in Posof and Lake Çildir (Figure 2).

Cultural modifications

The effects of cultural structure on water, vegetation and structuring have been evaluated in this factor. Structuring that is supposed to increase landscape value has not been observed much in the region. The effects of current cultural structure on landform and vegetation improve the quality. Although these areas do not have an effect on the total point because of the fact that they cover small surfaces in terms of scale, they should be taken into consideration while taking management decisions. Also,

as there is no industrialization in the region, there will be no negative effects originating from these places. Because of these reasons, there is neither negative nor positive effect of cultural modifications on the most part of the region (Figure 2).

Consequently, the "visual landscape quality" map for Ardahan and Kars has been formed by combining seven maps (Figure 3) . The points of the evaluations that have been conducted in the control zones of the land in order to control the approaches of the management can be seen in Figure 3. There has been seen no statistical difference between the visual quality values that have been formed as a result of the practice of the visual resource management that is created by BLM to the land and the quality values that have been obtained as a

result of the observations conducted 23 points in the land in consequence of the comparison which is made with paired samples T test. (t = 0.33, p = 0.74). This result proves that visual landscape quality map that has been formed by combining seven maps can be used in planning or different areas.

In Ardahan, first class visual landscape quality places constitute 4.92%, second class VLQ places constitute 18.75%, third class VLQ places constitute 68.02% and fourth class VLQ places constitute 8.29% of the area. Çildir and Posof have high visual landscape qualities while Hanak has the lowest landscape quality.

In Kars, first class visual landscape quality places constitute 15.56%, second class VLQ places constitute 36.28%, third class VLQ places constitute 46.31% and fourth class VLQ places constitute 1.83% of the area. Therefore, management decisions should be taken by taking the fact that the sensitivity of Ka izman is high into consideration. Sarikami and Susuz have the highest visual landscape quality values (Figure 3).

DISCUSSION

The visual resource management method has been practiced in regional and sub-regional scales in this study. As a result of the comparison between the management results and field observations, it has been stated that the method can be used in 1/ 100 000 or 1/ 50 000 scaled planning works. The method has been used with smaller scales in the examples of VRM Arica (2008) and Anonymous (2010). Landscape quality groups in the level of two cities that have 14969 km^2 have been formed as a result of the evaluation of the data that have been obtained from the inventory studies with seven criteria. Furthermore, the presented groups have been controlled according to the results that have been obtained by practicing BLM (2010b) form and their accuracy has been proved.

Digital elevation model maps that include protected areas and elevation groups and have a place in BLM form have been used to evaluate the effect of the landform on visual quality (Wu et al., 2006). The alterations in the field morphology and the essence of natural landscaped have been stated to improve the visual quality in many studies. The security of bases that have been used in the study, have been provided for this reason (Crawford, 1994; Mitchel, 1991; Arriaza et al., 2004; Wu et al., 2006). Additionally, forming geomorphologic maps that are special to the area and interpreting them will increase the reliability of criteria evaluations.

Corine land cover data have been used to interpret the data in the Bureau of land management form in the evaluation the effect of vegetation on visual quality. Within this context, an evaluation has been made to present the effects of vegetation and different land uses

on visual quality (Ode et al., 2008). Palmer (2004) used some landscape metrics regarding landscape ecology such as edge density, heterogeneity, fragmentation in his evaluation. Landscape will be included to the methodology by being added to the current vegetation evaluations in some of the ecology-based data.

Water is one of the significant criteria in visual quality studies (Ode et al., 2008) . Water is a landscape element that improves coherence, image ability and naturalness in visual perception (Ode et al., 2008; Palmer, 2004; Hammitt et al., 1994; Kuiper, 2000; Van Mansvelt and Kuiper, 1999) . The bottom of the water surface and water intensity has been measured in all of the studies that assess the visual quality. The parts from GIS database of EFM regarding streams, wetlands and barrages have been used to assess the location and the rate of the water in the research field. The existing data are enough to assess the visual landscape quality in the study.

Color

It has been stated that the land cover patterns from the land cover have similar colors and the differences in land cover will create different colors in land pattern (Kaplan and Kaplan, 1989). Also, the seasonal changes in vegetation will cause different color formation in land cover and it gains importance to present the seasonal effect of visual quality (Ahas et al., 2005; Hendriks et al., 2000; 1998; Van Mansvelt and Kuiper, 1999; Jessel, 2006). Interpretations considering the color combinations that have been formed by land pattern in the study have been made. Although Morgan (1999) presented seasonal changes of water, water has not been interpreted in color factor as it has been evaluated as a different criterion. Corine land cover data have been considered as sufficient for the interpretation of color criterion.

Influence of adjacent scenery has been considered as one of the main factors that has an effect on visual quality. It has been proved that it has an impact on visual quality in many studies (Weinstoerffer and Girardin, 2000; De la Fuente et al., 2006; Germino et al., 2001). In these studies, proportion of open land, view shed size and depth of view has been assessed. The areas that are far from 5 and 15 km above from the main road, the places whose height is above 2500 m and agricultural fields that provide deep point of view have been considered as influence of adjacent scenery zones that have high visual quality. As the field of application is smaller in the original methodology, the areas that have high influence of adjacent scenery effect have been pointed by starting from the dominating points. As it is difficult to make field observation in a 14969 km^2 area, main road routes have been used as base. The view shed size from the main roads has been taken according to the methodology that is presented by USA Bureau of Land Management (BLM, 2010b). In addition to the presented evaluation, visibility

analysis and influence of adjacent scenery values can be pointed through detailed field observations on the main roads, however, this approach has not been included as it is thought to take too much time.

Scarcity of an area is defined with the essence of rare landscape elements that are not widespread in that area. These landscape elements can be arranged as natural protected areas, rare high altitude areas, water surfaces and man-made cultural elements (Ode et al., 2008; Coeterier, 2002; Green, 1999). Scarcity factor should include landscape character that varies by region. The cultural elements that may be evaluated in scarcity factor have not been presented in this criterion as they are evaluated as a different criterion by themselves. The protected areas in the research field have been used in the evaluation of distribution of the height groups of the area and vegetation scarcity factor.

Cultural elements can be divided into two as the ones that reduce the quality and the ones that improve the quality. The criteria such as density of cultural elements (Van Mansvelt and Kuiper, 1999) and shape of line features (Darlington, 2002; Fairclough et al., 2002) have been evaluated in the study in which cultural illustration of landscape has been examined. While cultural structures like city structure, industrial structure and solid waste landfill sites reduce the quality, man-made elements like archeological sites and monumental structures improve the visual landscape quality (Wu et al., 2006). On the other hand, cultural land use patterns like widely seen agricultural areas have not been evaluated as they do not have an effect on visual quality. As it is difficult to reflect the point data to the space because of the scale of the research, the elements that affect the visual landscape quality negatively have been evaluated mainly. Integration of cultural landscape character to the upper scale in an area that has access to cultural data will increase the reliability of the evaluation about cultural part of the method. Bottom to top data flow is considered as more suitable within this context.

Conclusions

In conclusion, as committed in European landscape convention, our country requires to classify the landscapes and to present the situation regarding landscape quality. This study has shown that visual landscape quality can be assessed with geographic information system. The ground for a successful visual resource analysis will be evaluated according to the quality of the maps that have been formed as a result of the inventory studies. With the evaluation of the related data in upper scale, visual landscape quality assessment will be made in regional or sub-regional scale (1/ 50 000, 1/ 100 000).

Visual landscape quality is used for different purposes in landscape planning. The methodology that is used to

assess the visual landscape quality can also be applied to sub-scales. The areas of high visual quality should be protected by the decision regarding recreation and tourism in the regional or sub- regional scale studies. Following the planning decisions that are to be made in this area, more detailed visual quality studies should be conducted and they should be re-evaluated with the planning decision that are to be made on local scale. On the other hand, visual landscape quality analysis will create a base for strategic environment assessment. It will especially create a base for the planning studies that are to be done in region, sub-region, basin and some city groups or on a local scale.

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